1,109,914

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,109,914

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Int. Cl.:—H 01 r 17/04

COMPLETE SPECIFICATION

Improvements in or relating to coaxial cable connectors.

I, ERIC LIONEL HUTCHINGS, of 100A Walton Street, Aylesbury, Buckinghamshire, a British subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to connectors for coaxial cables and in particular to connectors for terminating lengths of coaxial cable so that the inner conductor and screening braid are insulated from one another and are electrically connected with terminal members adapted to receive or engage with other electrical conductors. Such a connector may constitute a component of a plug-and-socket coupling or may be employed to connect a coaxial cable to permanent wiring within an apparatus.

The known arrangements for this purpose usually require either the use of solder, the employment of complex crimping tools or the assembly of several initially separate members in an accurately determined relationship. It is an object of the present invention to provide a coaxial connector which is relatively simple to manufacture, which contains a minimum of component parts and by the use of which recourse to soldering or crimping may be avoided.

According to the present invention there is provided a coaxial cable connector having concentric contact members of which one at least includes an axially extending resilient portion bent first radially outwardly and then inwardly of said member whereby axial movement relative to said contact member of a surrounding member urges the free end of said resilient portion inwardly of said contact member to engage a conductor of said cable inserted therein.

A preferred embodiment of coaxial cable connector in accordance with the present invention comprises a tubular metal member formed with a plurality of longitudinally extending resilient tongues near one end. These tongues are bent first radially outwardly and then inwardly of said tubular member and their outwardly bent portions engaged by a surrounding body member of the connector so that relative axial movement of the body member and contact member causes the ends of the tongues, preferably formed as sharp prongs, to be urged inwardly whereby they penetrate the outer insulating sheath of a coaxial cable to make contact with the screening braid, thus effecting both electrical and mechanical connection with the cable. The connector also comprises a tubular inner contact member, supported within the outer contact member by an insulator. The inner contact member also is provided with a longitudinally extending tongue which is urged inwardly, by relative axial movement between it and an insulating member surrounding the inner contact member, to engage the bared centre conductor of the cable which is inserted within the inner contact member. The insulating member which surrounds the inner contact member may be a bush secured to a body portion enclosing the outer contact member by opposed radial arms passing through open ended slots formed in the outer contact member. Preferably the insulating bush is moulded integrally with the body member. The two body members are best arranged to be screwed together to produce simultaneous inward pressure on the tongues of the inner and outer contact members,

Further features and advantages of the invention will become apparent from the ensuing description, taken in conjuction with the drawings of which :—

Figure 1 is a sectional side elevation of one member of a connector in accordance with the invention.

Figure 1A is a sectional end view taken along the line X-X of Figure 1,

Figure 1B is a sectional end view taken along the line Y-Y in Figure 1,

Figure 2 is a sectional elevation of one body member of a connector according to the invention,

Figure 2A is an end view of the connector body member shown in Figure 2,

Figure 3 is a sectional elevation of another connector body member,

Figure 3A is an end view of the body member shown in Figure 3,

Figure 4 is a sectional elevation of an assembled connector formed of the component members described in relation to Figures 1-3A,

Figure 5 shows a sectional elevation through a modified form of one member of a connector in accordance with the invention, and

Figure 6 shows an enlarged view of the prongs of a contact tongue.

The connector outer contact member shown in Figures 1, 1A and 1B comprises a generally cylindrical metal tube 1, within which an inner contact member 2 is supported by means of an annular insulator 3. The inner contact member 2 may be rivetted into the annular insulator, as shown, and this insulator may be circumferentially grooved to allow tubular outer contact member 1 to be inwardly deformed to secure the insulator in position. Other methods of securing the parts together may be employed, including the moulding of the insulator about the inner contact member and/or within the outer contact member.

The left-hand end of contact member 1 is provided with two diametrically opposite open slots such as 4 and its right-hand end is slit to form four symmetrically disposed and longitudinally extending resilient tongues 5, the free ends of which are bent first radially outwardly of the contact member and then inwardly, advantageously terminating in sharp, inwardly directed prongs 15, as shown.

Inner contact member 2 is also tubular and is provided with longitudinally extending resilient tongue 13, the free end 14 of which is bent first radially outwardly of the contact member and then inwardly. Although contact members 1 and 2 are shown as being plug members, they may equally well be formed as socket members to accept a mating plug member, or as terminal members for attachment to printed circuit conductors or shaped to permit other conductors to be soldered, wrapped or crimped thereto.

The body member shown in Figures 2 and 2A is a generally tubular member 6 formed of a suitable insulating material, within which a centrally disposed bush member 7 is supported by integral arms 16 connecting the bush with the tubular portion. The central aperture 17 of bush member 7 is of such a diameter that when body member 6 is assembled upon contact member 1 with arms 16 passing through slots 4, bush 7 will pass freely over inner contact member 2 to engage the outwardly bent portion of resilient tongue 13, thus urging the free end of the tongue inwardly of contact member 2 to engage the bared central conductor of a coaxial cable, as shown in Figure 4. The outer surface of body member 6 is conveniently knurled at its outer end, as shown at 8, while its inner end is preferably externally screw-threaded to engage the second body member shown in Figures 3 and 3A.

The second body member 9, shown in Figures 3 and 3A, has a portion of larger diameter which is internally screw-threaded to engage body member 6 and which is joined by a conical transition portion 10 to a portion of smaller diameter, the outer end of which is conveniently knurled, as shown at 11, and is provided with an inturned flange 12.

Withdrawal of contact member 1 from the assembled connector is prevented by the engagement of prongs 15 with the conical portion 10 of body member 9.

The male and female screw threads could be interchanged between the body portions, though the arrangement shown is manifestly the most convenient. Alternatively other forms of attachment may be used to secure the two body portions together, for example, one member may comprise a circumferential ridge over which the other body member is urged by resilient deformation to secure the two members together.

In one modification of the arrangement above described, for use where a metal-bodied connector is desired, insulating bush 7 may be secured to a metal body member, for example, by forming the metal member with inwardly directed support arms similar to arms 16 which may be deformed to grip insulating bush 7 or by moulding the insulating bush about such support arms. In another modification, bush 7 may be a free component, internally circumferentially grooved so that when assembled upon contact member 2 the outward resilient pressure of tongue 13 will retain the bush in position.

As the connector is assembled, bush 7 engages the outwardly bent portions of tongue 13, the inner end of which is forced into contact with the bared inner conductor 21 of cable 19.

As the two portions of the body are screwed together the conical inner surface 10 of body member 9 engages the outwardly bent portions of tongues 6 and forces these inwardly of contact member 1, driving prongs 15 through the outer insulating sheath 18 of a coaxial cable 19 into engagement with the cable braid 20, as shown in Figure 4. Thus the use of the connector according to

this embodiment of the invention requires only the single operation of stripping the inner conductor.

The form of tongues 5 of outer contact member 1 which is shown in Figures 1 and 4 may possibly be found unsuitable where cables with inner-conductor insulation of low mechanical strength are to be terminated. In such cases the form of the tongues may be modified as shown at 5A and 14A in Figure 5. This modified form of tongue more readily permits resilient deformation of the tongues to accept cables of differing diameter.

Figure 6 shows a modified form of tongue end which has advantages in ensuring contact with the sheath without damage to the cable. Contact to the sheath is made by inner spikes 5B, while flanking portions 5C provide large bearing surfaces to prevent excessive concentration of stress liable to damage the cable.

WHAT I CLAIM IS :—

1. A coaxial cable connector having concentric contact members of which one at least includes an axially extending resilient portion bent first radially outwardly and then inwardly to engage a conductor of said cable as a result of radially inward force exerted thereon by axial movement relative thereto of a surround member of said connector.

2. A connector in accordance with claim 1, wherein the inner contact member comprises a hollow portion adapted to receive the central conductor of a coaxial cable, said hollow portion being axially slotted and including a resilient tongue bent first outwardly and then inwardly to enter said slot, the outwardly bent portion of said tongue being engaged by a member of insulating material surrounding said contact member, whereby axial movement of said insulating member with respect to said contact member exerts radially inward force on said tongue.

3. A connector in accordance with claim 2 wherein said member of insulating material is formed integrally with an insulating body member surrounding said outer contact member.

4. A connector in accordance with claim 2 wherein said member of insulating material is secured to a metal body member surrounding said outer contact member.

5. A connector in accordance with claim 2 wherein said member of insulating material is a free component having its bore circumferentially grooved to engage the outwardly bent portion of the resilient tongue of said inner contact member being retained in position thereupon after assembly.

6. A connector in accordance with any preceding claim wherein said outer contact member comprises a tubular metal member slotted to form axially extending resilient tongues which are bent first radially outwardly and then inwardly of said contact member to engage the outer conductor of a Smith- job 379- pat spec 1109914—THREE coaxial cable inserted therein when urged inwardly by the engagement therewith of a relatively movable body member of said connector.

7. A connector in accordance with claim 6 wherein the portion of said body member which engages said tongues is conical.

8. A connector in accordance with claims 6 or 7 wherein the inwardly directed ends of said resilient tongues of said outer contact member are each divided to form sharp pointed prongs capable of penetrating the outer insulating sheath of a coaxial cable to engage the screening braid thereof.

9. A connector in accordance with either of claims 7 or 8 wherein said tongues are so formed as to permit resilient deformation thereof such as to prevent damage to the interconductor insulator of a cable to which said connector is attached.

10. A connector in accordance with any of claims 7 to 9 wherein said outer contact member is provided with four symmetrically disposed resilient tongues.

11. A coaxial cable connector substantially as described with reference to the drawings.

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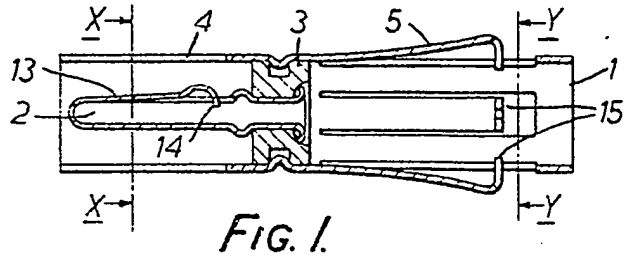

FIG. 1.

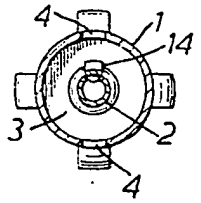

FIG. 1A

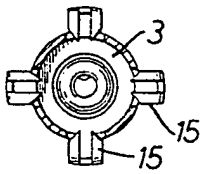

FIG. 1B.

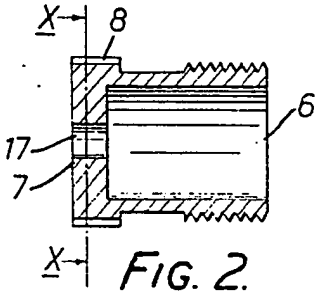

FIG. 2.

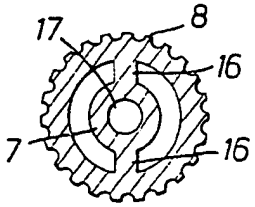

FIG. 2A

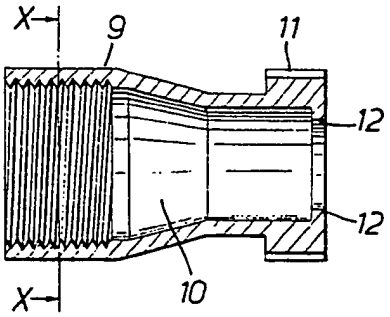

FIG. 3.

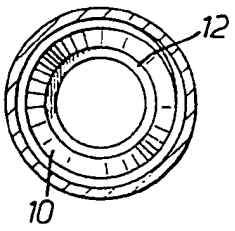

FIG. 3A.

1,109,914 COMPLETE SPECIFICATION
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SHEETS 1 & 2

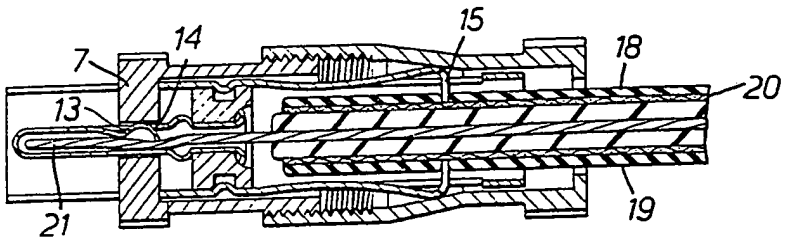

FIG. 4

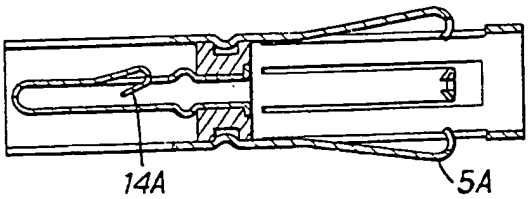

FIG. 5.

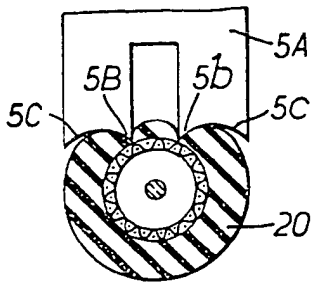

FIG. 6.

1,109,914 COMPLETE SPECIFICATION
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SHEETS 1 & 2

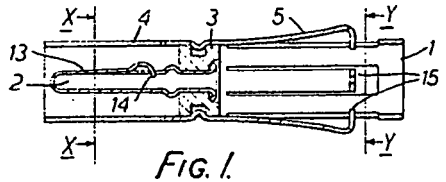

FIG. 1.

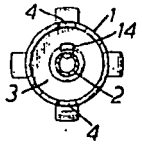

FIG. 1A

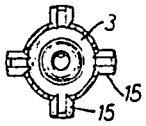

FIG. 1B.

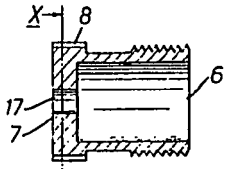

FIG. 2.

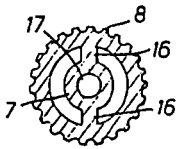

FIG. 2A

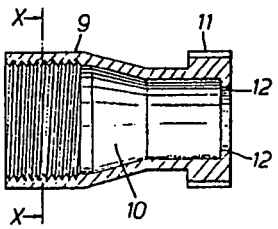

FIG. 3.

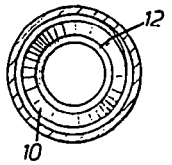

FIG. 3A.

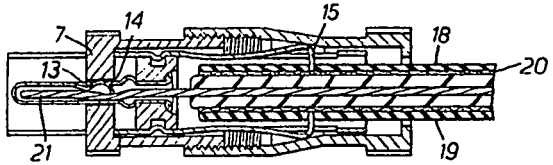

FIG. 4

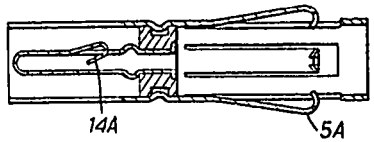

FIG. 5.

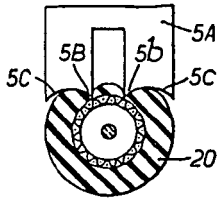

FIG. 6.